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NOTES ON SOME SPECIES OF EPITONIUM,
SUBGENUS NITIDISCALA,
FROM THE WEST COAST OF NORTH AMERICA

BY

A. M. STRONG

Los Angeles, California

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NOTES ON SOME SPECIES OF EPITONIUM,
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Dr. P. P. Carpenter, in his review of the shells from the Vancouver and California provinces, published in the Report of the British Association for the Advancement of Sciences for 1863, issued in 1864 and commonly referred to as the "Supplementary Report", listed six species under the genus name of *Scalaria* which are now placed in the genus *Epitonium*, subgenus *Nitidiscala*. Four of these are given as new and are the first species of the genus to be described from the provinces. The other two are referred to species previously described, respectively, from the Philippines and Panama. A considerable amount of material was available to Carpenter in this work and it is to be expected that most of the shore forms were represented, though the number of specimens of some of them was probably few. That Carpenter was somewhat uncertain in regard to his determinations in *Scalaria* is shown by the use of question marks and the following statement made in connection with his description of the Panama species: "The above species are published with doubt, as *Scalaria* are seldom seen in sufficient numbers to ascertain the limits of specific variation. Species described from one or two specimens must always be regarded as provisionally registered."¹ Carpenter did not designate type specimens and the material on which he based his descriptions is in some cases difficult to place. Moreover, he would seem to have changed the use of names in later identifications. Other writers have followed these changes without referring to original descriptions or material, resulting in much confusion.

A few of the west coast species are now available in large numbers, making it possible to draw definite conclusions in regard to them. In these it is found that the number of varices and length and diameter for a given number of whorls are among the least variable characters. Little attention seems to have been paid to these characters. A comparison of

¹ Proc. Zool. Soc., London, 1856, p. 165.

Dall's identifications and Arnold's descriptions with Carpenter's original descriptions shows wide differences on these points.

There is little difficulty in placing Carpenter's *Scalaria* (? var. *indianorum*) *tinctoria*, which is listed² as inhabiting Cedros Islands, Lower California (Ayres), and San Pedro (Cooper), with the comment, "The Lower California shell may prove distinct". The species is briefly described as³ "Costae acute, not reflexed, whorls posteriorly tinged with brownish purple." The only *Epitonium* known from the coast which could be described as posteriorly tinged with brownish purple is a small shell which is quite common along the southern California coast. They live in colonies in the sand at the base of sea anemones, to which they are attached by a mucus thread. The number of varices vary from 10 to 13, with a great deal of variation in the amount of coronation or angulation at the shoulder of the whorl. In some specimens the varices round into the suture with almost no sign of angulation, in others a varying number of the upper whorls show distinct coronation, while the varices on the later whorls are rounded. Occasional specimens are found on which the coronation is distinct on all whorls. The amount of reflection to the varices is also quite variable. The extent of the brown coloration in the suture is sometimes slight and in all cases fades out in dead shells or those which have been in a cabinet for any length of time. A typical adult shell with 3 smooth nuclear and 8 subsequent sculptured whorls measures 12 mm. in length by 5.5 mm. in diameter. Carpenter gave no measurements or detailed description for this species. A specimen, No. 19,510 in the United States National Museum, is labeled "*Scalaria indianorum* variety" and was collected by Cooper at San Pedro. It is probably one of the specimens referred to by Carpenter in his description. While this shell now shows no signs of the brown coloration, it agrees in all other ways with living shells from the same locality which show the colored band at the suture.

Scalaria indianorum is listed by Carpenter from Neah Bay, Washington (Swan),⁴ and described⁵ as having 8 to 15 (usually about 12) varices and 10 whorls measuring 26 mm. in length by 9 mm. in diameter. A specimen, No. 15,521 in the United States National Museum, from a

² Suppl. Report, 1864, p. 660, No. 409b.

³ Ann. Mag. Nat. Hist., Ser. 3, vol. 15, 1865, p. 31.

⁴ Suppl. Report, 1864, p. 660, No. 409.

⁵ Ann. Mag. Nat. Hist., ser. 3, vol. 15, 1865, p. 31.

lot labeled "Type of *S. indianorum* Cpr.," with 12 varices and 8 whorls without the lost nucleus, agrees otherwise with the description. Except for the much larger size, the description would come very close to a bleached specimen of *Epitonium tinctum* Cpr. on which the coronation and reflection to the varices is slight. It is evidently for this reason that Carpenter listed the latter as a doubtful variety. *Epitonium indianorum* Cpr. is a well recognized species which never shows any sign of the brown coloration in the suture. It is not only the largest member of the subgenus on the coast but the most northern in its distribution. Mr. George Willett, of the Los Angeles Museum, has collected the species in considerable numbers at Forrester Island, Alaska, some of the specimens with 12 whorls reaching a length of 35 mm. The unusual variation in the number of varices given in the description indicates that Carpenter may have included more than one species under the name in his determinations. The southern California record for the species is very doubtful and probably based on the consideration that *Epitonium tinctum* Cpr. can be classed as a variety.

"*Scalaria subcoronata* n.s." is listed by Carpenter from Monterey⁶ and described⁷ as a shell with but 13 varices, a little coronated in the young shell, and 10 whorls measuring 11 mm. in length by 5.5 mm. in diameter. Carpenter states in his description that the species is "State Collection No. 393a". This collection, made by Cooper for the California State Geological Survey, was later turned over to the State University, but the numbers do not seem to have been preserved. Specimens in the University of California collection marked "*Epitonium subcoronatum* Cpr., Cooper collection" are probably the ones referred to. A specimen, No. 14,830b in the United States National Museum, is from a lot labeled "Type of *E. subcoronatum* Cpr." and the lot is undoubtedly part of the original material. In both cases the specimens agree with Carpenter's description and measurements, but they are the shells which in a fresh condition show the brown coloration in the suture. *Scalaria subcoronata* Cpr. must be considered a synonym of *Epitonium tinctum* Cpr.

"*Scalaria crebricostata* n.s." was first mentioned by Carpenter as occurring at Monterey and San Pedro⁸ and later described⁹ as a shell with 10 whorls, measuring 17.5 mm. in length by 4.5 mm. in diameter,

⁶ Suppl. Report., 1864, p. 660, No. 411.

⁷ Proc. Cal. Ac. Sci., vol. 3, 1865, p. 221.

⁸ Suppl. Report, 1864, p. 660, No. 412.

having 15 reflexed varices, coronating against the suture. This would seem to be a much more slender shell than the others with more varices. Carpenter states in his description that the species is "State Collection No. 393". A lot in the University of California collection labeled "*Epitonium crebricostatum* Cpr., Cooper Collection" contains a number of specimens of *Epitonium tinctum* Cpr. and a single slender specimen with more numerous varices which seems to be the young of a different species. A specimen, No. 14,831 in the United States National Museum, is said to be characteristic of a lot labeled "Type of *E. crebricostatum* Cpr." It is much shorter and wider than the dimensions given by Carpenter and has only 12 varices. The varices are strongly reflected and coronated, with the exposed faces deeply axially striated. In size, shape, and number of varices this specimen agrees with *Epitonium tinctum* Cpr. and in spite of being a thicker and heavier shell may be an extreme form of that species. Unless a definite type can be fixed for Carpenter's description, the species must be left as indeterminate.

Carpenter also listed "*Scalaria ?gracilis*" and "*Scalaria ?Cumingii*" as occurring at San Diego.¹⁰ Dall states that *Scalaria gracilis* Sby.¹¹ "was originally described as a Philippine shell and its reference to the west coast of America is due to a misidentification." *Scalaria cumingii* Cpr. was described from Panama¹² as a shell with 8 or 9 varices, measuring 9 mm. in length by 3.5 mm. in diameter. No further reference to these two species from the California coast is found in the literature and it would be difficult to determine which of the California shells were referred to by Carpenter under these names.

Dr. J. G. Cooper, who collected many of the shells described and identified by Carpenter, lists¹³ *Scala hindsii* Cpr. as living, Bodega Bay to San Diego, and adds "Given in Catal. of 1888 as *S. subcoronata* which is now called a variety of the Panama shell, though specimens have not been found in Mexico." *Scalaria hindsii* Cpr. was described from Panama¹⁴ as a shell having 10 whorls, measuring 26 mm. in length by 10 mm.

⁹ Proc. Cal. Ac. Sci., vol. 3, 1865, p. 222.

¹⁰ Suppl. Report, 1864, p. 660.

¹¹ Proc. U. S. Nat. Mus., vol. 53, 1917, p. 487.

¹² Proc. Zool. Soc., London, 1856, p. 165.

¹³ Cal. State Mining Bureau, Bulletin No. 4, 1894, p. 31.

¹⁴ Proc. Zool. Soc., London, 1856, p. 165.

in diameter, with 8 sharp varices. This is evidently a case where Carpenter changed identifications without a published record.

Dr. Ralph Arnold described a number of Pleistocene and Pliocene¹⁵ fossils from San Pedro, California, under the genus name of *Scala*. Among these the four belonging in the subgenus *Nitidiscala* are referred to Carpenter's living species on the strength of identifications made by Dr. Dall. *Scala crebricostata* Cpr. is very briefly described¹⁶ without measurements or figure. It is stated that the "specimens are identified as questionable by Dr. Dall." *Scala indianorum* Cpr. is described and figured¹⁷ as a shell with 10 whorls and 12 to 16 heavy varices, measuring 26.5 mm. in length by 9 mm. in diameter. The description agrees in every way with Carpenter's original description. *Scala hindsii* Cpr. is stated¹⁸ to equal *Scalaria subcoronata* Cpr. (*vide* Cooper) and is described as a shell with 8 whorls, 8 to 12 varices, sometimes reflexed and prominently coronated. The measurements are given as length 11.5 mm., diameter 5.2 mm. The description agrees with the original description of *Scalaria subcoronata* Cpr. and with those specimens of the living *Epitonium tinctum* Cpr. on which all the whorls show the coronation of the varices.

Under the name of *Scala tinctorum* Cpr. Arnold described and figured¹⁹ a shell with 9 or 10 whorls and 10 to 12 varices measuring 25 mm. in length by 10 mm. in diameter. It is stated that this shell differs from *Scala indianorum* Cpr. by having "a more delicate shell, thinner varices, which are not reflexed as a rule, thinner lip and much deeper suture." This is a larger shell and quite different from *Epitonium tinctum* Cpr. as known from the living specimens. Both the description and figure agree quite well with a shell which is frequently washed in along the sandy beaches of the California coast. A specimen of this shell, No. 56052 in the United States National Museum, bears a label showing an old identification by Dr. Dall as "*Epitonium indianorum tinctum* Cpr." The specimen comes from Monterey. This species seems to be left without a name and is described as *Epitonium (Nitidiscala) cooperi* in the present paper.

Dr. Dall in 1917 made the following statement in regard to the use

¹⁵ The beds which Arnold assigned to the upper Pliocene are now believed to be lower Pleistocene.

¹⁶ Mem. Cal. Ac. Sci., vol. 3, 1903, p. 263.

¹⁷ *loc. cit.*, p. 264, pl. 5, fig. 4.

¹⁸ *loc. cit.*, p. 264.

¹⁹ *loc. cit.*, p. 265, pl. 5, fig. 3.

of the name *Epitonium hindsii* Cpr. for a California shell²⁰: "Carpenter described from Panama a species of *Nitidoscala* with 8 varices, under the name of *S. hindsii*. By some confusion he later transferred the name in 1865 to a well known shell from California which has 11 to 14 varices". Dall proposed the name of *Epitonium fallaciosum* for the shell "commonly known from California as *S. hindsii* Cpr." but gave no description, designated no type and gave no references to any published record. In a later publication,²¹ under *Nitidoscala fallaciosa* Dall, he referred to Keep, West Coast Shells (ed. 1911), p. 183, fig. 174. This is a figure of an adult specimen of *Epitonium tinctum* Cpr. A specimen, No. 46,222 in the United States National Museum, is labeled *E. "hindsii"* Cpr.—*fallaciosum* Dall, San Pedro, Carpenter. This is the same as the shell described by Arnold as *Scala tincta* Cpr. Specimens in the Cooper, Hemphill and other old California collections show that the name *S. hindsii* Cpr. has been applied to two distinct species of California shells. However, Cooper and Arnold are the only ones definitely to fix the names by published records. In view of these facts it is evident that the shell "commonly known from California as *S. hindsii* Cpr." is *Epitonium tinctum* Cpr. and, in spite of the fact that Dall probably did not so intend it, *Epitonium fallaciosum* Dall must take its place with "*Epitonium subcoronatum*" (Cpr.) in the synonymy of *tinctum*.

Epitonium (Nitidiscala) tiara Cpr. is listed by Dall²² from California and he states²³ "This species has 12 varices and ranges from Catalina to Todos Santos Bay, Lower California, according to specimens so named by Carpenter in the Stearns' collection. It was originally described from Panama and I feel some doubt as to whether the California species is conspecific with that from Panama, but the question can only be settled by a comparison with the type in the British Museum." The shell described by Carpenter was in the Cuming collection from Panama. It has been pointed out by Gray and others that the original type lots in this collection were in some cases replaced by better specimens, not always from the type locality, and the types so lost. In the case of the smaller shells, to which the earlier authorities paid little attention, this leads to much un-

²⁰ Proc. U. S. Nat. Mus., vol. 53, 1917, p. 478.

²¹ Bulletin 112, U. S. Nat. Mus., 1921, p. 115.

²² Bulletin 112, U. S. Nat. Mus., 1921, p. 115.

²³ Proc. U. S. Nat. Mus., vol. 53, 1917, p. 480.

certainty. Carpenter's description,²⁴ which is very brief, calls for a shell of 7 whorls measuring 7 mm. in length by 4 mm, in diameter, with the varices slightly winged below the sutures, and might easily apply to several different species equally well. In order to determine the species it would be necessary to compare a representative collection from the Panama fauna with both Carpenter's description and the specimens in the Cuming collection. Carpenter's specimens in the Stearns' collection can not be located and in view of the lack of all positive data it would seem best to cancel the name from the California lists.

In addition to the species described by Carpenter, the subgenus *Nitidiscala* contains about fifteen species which are described or recorded from California. Most of these are from deep water and are known to the California collectors by only a few specimens, if at all. A few species have been collected in considerable numbers. Among these is *Epitonium sawinae* Dall,²⁵ described as collected off the south side of Catalina Island. *Epitonium sawinae* variety ? *catalinense* Dall²⁶ was later described from Catalina and the range of the typical form given as from Vancouver to San Diego, and possibly to the Gulf of California. Still later, Dall²⁷ listed these two forms as distinct species and gave the range of *Epitonium sawinae* Dall as from Monterey to Catalina Island. *Epitonium catalinense* Dall is listed only from the type locality, Catalina Island, and is said to differ in the greater number of varices, 22 to 24 as against 16 to 19 in *Epitonium sawinae*, in the absence of angulation to the varices and by the presence of a minute umbilical perforation. There is also some difference in the measurements of the type specimens. An examination of a large number of specimens dredged in from 10 to 40 fms. at various points off the coast of southern California shows that these differences are not constant. The number of varices is more often over 20 than under and nearly all show at least some sign of angulation or spine on the varices at the shoulder of the whorls. *Epitonium catalinense* can hardly be considered even as a valid variety of *Epitonium sawinae*. *Epitonium catalinae* Dall²⁸ is an entirely different shell. Packard reports²⁹ that *Epitonium sawinae*

²⁴ Proc. Zool. Soc. London, 1865, p. 165.

²⁵ Proc. Biol. Soc. Wash., vol. 16, 1903, p. 193.

²⁶ Proc. U. S. Nat. Mus., vol. 53, 1917, p. 481.

²⁷ Bulletin 112, U. S. Nat. Mus., 1921, p. 115.

²⁸ Proc. U. S. Nat. Mus., vol. 34, 1908, p. 252.

²⁹ Univ. Calif. Publ. in Zool., vol. 14, 1918, p. 319.

was dredged in considerable numbers in from 39 to 46 fms. off the Golden Gate, San Francisco.

Another species in the subgenus which has been collected in large numbers in southern California is found living just under the surface of the mud on the tide flats of the bays. It has been identified as *Epitonium subcoronatum* Cpr. but, while it is of about the same length and has about the same number of whorls as those called for in Carpenter's description, it is a much more slender shell. The strongly reflected varices number 9 or 10 and are deeply axially striated. This seems to be the shell described as *Epitonium californicum* Dall.³⁰ The type locality for the species is given as San Miguel Island and the range from there to the Gulf of California.

More complete descriptions of these five species have been prepared and figures of the specimens in the U. S. National Museum secured. In addition, good specimens from the local collections have been figured and the specimens themselves placed in the type collection of the San Diego Society of Natural History. Sufficient material to fix the geographic ranges for the various species was not available.

The writer wishes to acknowledge his indebtedness to Dr. Alexander Wetmore, of the U. S. National Museum, for photographs and the loan of specimens, to Mr. Wayne Loel for the photographs of the specimens placed in the collection of the San Diego Society of Natural History, and to Dr. U. S. Grant, IV, for assistance in the preparation of the manuscript.

Epitonium (*Nitidiscala*) *indianorum* (Carpenter)

Plate 20, figures 1, 2a, 2b

Scalaria indianorum Carpenter, Suppl. Report, British Assoc., 1864, p. 660.—
Ann. Mag. Nat. Hist., ser. 3, vol. 15, 1865, p. 31.

Scala indianorum Carpenter, Arnold, Mem. Cal. Ac. Sci., vol. 3, 1903, p. 264,
pl. 5, fig. 4.

Epitonium indianorum Carpenter, Oldroyd, Univ. Washington, Publ. Puget
Sound Biol. Sta., vol. 4, 1924, p. 107.

Epitonium indianorum Carpenter, Oldroyd, Stanford Univ. Publ., Geol. Sci.,
vol. 2, pt. 2, 1927, p. 57.

Shell large for the genus, white, fairly thick; apex very sharp, with the extreme tip broken in all the specimens examined; remaining whorls about 11 in the adult, well rounded and separated by a deep suture, regularly increasing in size, forming a slender, turreted spire; ornamented with 13 or 14 thin varices

³⁰ Proc. U. S. Nat. Mus., vol. 53, 1917, p. 482.

which meet and fuse in the suture and ascend the spire in a continuous line approximately parallel with the right side of the shell; on the middle and lower portion of the whorls the varices are somewhat reflected, exposing the edges of the layers of cell-structure as fine axial striations; at the shoulder of the whorls the varices become erect and are more or less expanded to form coronating points, beyond which they dip concavely into the suture; on the base the varices continue without change to the raised columellar lip with which they fuse; spiral sculpture entirely absent; aperture nearly circular; columellar lip evenly curved, slightly expanded at the junction with the basal lip and extending posteriorly to a junction with the outer lip, which is thickened by the last varix.

The specimen figured as No. 343, S.D.S.N.H., was collected by Mr. George Willett at Forrester Island, Alaska, and measures, length 35, maximum diameter 12 mm.

Epitonium (Nitidiscala) tinctum (Carpenter)

Plate 20, figures 3, 4, 5a, 5b

Scalaria (? *indianorum* var.) *tincta* Carpenter, Suppl. Report, British Assoc., 1864, p. 660.—Ann. Mag. Nat. Hist., ser. 3, vol. 15, 1865, p. 31.

Scalaria subcoronata Carpenter, Suppl. Report, British Assoc., 1864, p. 660.—Proc. Cal. Ac. Sci., vol. 3, 1865, p. 221.

Scala hindsii Carpenter, Arnold, Mem. Cal. Ac. Sci. vol. 3, 1903, p. 264.

Epitonium hindsii Carpenter, Keep, West Coast Shells, ed. 1911, p. 183, fig. 174.

Epitonium (Nitidoscala) fallaciosum Dall, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 478.

Epitonium tinctum Carpenter, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 58.

Epitonium subcoronatum Carpenter, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 58.

Epitonium fallaciosum Dall, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 59.

Shell small, fairly thick, with, in fresh specimens, a narrow, ill-defined, purplish or brownish band just below the sutures; nuclear whorls 3, minute, elevated, smooth, separated from the normal whorls by a slight constriction and forming a sharp point to the spire; normal whorls about 8 in the adult, well rounded and separated by a deep suture, rapidly but regularly increasing in size; ornamented with 11 or 12 sharp varices which meet and fuse in the sutures and ascend the spire in a continuous line approximately parallel with the right side of the shell; on the middle and lower portion of the whorls the varices are more or less reflected, exposing the edges of the layers of cell-structure as axial striations; in the sutures the varices become erect and at the shoulder of the whorls are frequently expanded to form coronating points; on the base the varices continue without change to the raised columellar lip with which they fuse; spiral sculpture entirely absent; aperture nearly circular; columellar lip curved, becoming thickened anteriorly, and extending posteriorly to a junction with the outer lip, which is thickened by the last varix.

The specimen figured as No. 344, S.D.S.N.H., comes from Point Vincent, near San Pedro, California, and measures, length 12, maximum diameter 5.5 mm.

The species differs from *Epitonium indianorum* (Carpenter) principally in the smaller size, more robust form, and in the presence of the color band.

Epitonium (Nitidiscala) *cooperi* Strong, new species

Plate 20, figures 6a, 6b, 7, 8a, 8b

"*Scala tinctorum* Carpenter," Arnold, Mem. Cal. Ac. Sci., vol. 3, 1903, p. 265, pl. 5, fig. 3, not of Carpenter, 1864.

Epitonium hindsi (Carpenter), Packard, Univ. Cal. Publ. in Zool., vol. 14, 1918, p. 319, pl. 36, figs. 14a and 14b.

Epitonium fallaciosum Dall, Jordan, Proc. Cal. Ac. Sci., ser. 4, vol. 15, 1926, p. 245.

Shell of medium size, pure white, thin; apex sharp, with the extreme tip broken in all the specimens examined; remaining whorls about 8 in the adult, almost semi-circular in outline between the very deep sutures, regularly increasing in size, forming a slender turreted spire; ornamented with 11 or 12 thin varices which touch the varix on the proceeding whorl before reaching the bottom of the suture, but which do not fuse, and ascend the spire in a continuous line approximately parallel with the right side of the shell; varices on the middle and lower portion of the whorls somewhat reflexed, exposing the edges of the layers of cell-structure as faint axial striations, becoming erect and expanded at the shoulder of the whorls where they form coronating points, beyond which they dip concavely into the sutures; on the base the varices continue without change to the raised columellar lip under which they dip; spiral sculpture entirely absent; aperture nearly circular; columellar lip raised, sharp, curved, somewhat expanded at the junction with the basal lip, extending posteriorly to a junction with the outer lip, which is thickened by the last varix.

The type, No. 345, S.D.S.N.H., comes from San Pedro, California, and measures, length 20, maximum diameter 8 mm.

The species differs from the other species in the subgenus found on the west coast in the thinness of the shell and the very deep sutures between the loosely coiled whorls.

Epitonium (Nitidiscala) *sawinae* Dall

Plate 20, figures 9, 10

Epitonium sawinae Dall, Proc. Biol. Soc. Wash., vol. 16, 1903, p. 193.—Bulletin 112, U. S. Nat. Mus., 1921, pl. 6, fig. 12.

Epitonium sawinae Dall, variety? *catalinense* Dall, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 481.

Epitonium sawinae Dall, Packard, Univ. Cal. Publ. in Zool., vol. 14, 1918, p. 319.

Epitonium sawinae Dall, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 60.

Epitonium catalinense Dall, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 61.

Shell small, white, thin; nuclear whorls a little over 3, minute, elevated, sculptured with microscopic axial striations, the sculpture changing abruptly to that of the normal whorls; normal whorls about 8 in the adult, well rounded and separated by a deep suture, regularly increasing in size, forming a slender turreted spire; ornamented with numerous, low, sharp, nearly erect varices, which vary in number on the different whorls as well as on different specimens, but average about 20; varices not always meeting in the sutures but, when they do, fusing and ascending the spire in a line approximately parallel with the right side of the shell; at the shoulder of the whorls there is sometimes developed an expanded angle or even a small, sharp spine; on the base the varices continue without change to the base of the columellar lip; spiral sculpture entirely absent; aperture nearly circular; columellar lip thin, sharp, curved, flatly reflected toward the junction with the basal lip, the reflection more or less completely concealing a minute umbilical perforation, and extending posteriorly to a junction with the outer lip, which is thickened by the last varix.

The type, which is figured, was dredged near Avalon, Catalina Island, California, and measures, length 10.5, maximum diameter 4 mm.

The large number of sharp varices makes the species quite distinct among the west coast species in the subgenus.

Epitonium (*Nitidiscala*) *californicum* Dall

Plate 20, figures 11, 12a, 12b

Epitonium californicum Dall, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 481.

Epitonium californicum Dall, Oldroyd, Stanford Univ. Publ., Geol. Sci., vol. 2, pt. 2, 1927, p. 62.

Shell small, white, thin; nuclear whorls about one and a half, forming a flattened point to the sharp apex; normal whorls about 9 in the adult, well rounded and separated by a deep suture, regularly increasing in size, forming a slender turreted spire; ornamented with 9 or 10 thin varices which meet and fuse in the sutures and ascend the spire in a continuous line approximately parallel with the right side of the shell; the varices are strongly reflected and the edges of the layers of cell-structure separate to form deep axial striations; just below the suture the varices are suddenly contracted, leaving a sharp angle or spine coronating the shoulder of the whorls; on the base the varices continue to the raised columellar lip under which they dip; spiral sculpture entirely absent; aperture nearly circular; columellar lip curved, becoming expanded and striated anteriorly, and extending posteriorly to the junction with the outer lip, which is thickened by the last varix.

The specimen figured, No. 346 S.D.S.N.H., comes from Alamitos Bay, Los Angeles County, California, and measures, length 10, maximum diameter 4 mm.

This species resembles *Epitonium tinctum* (Carpenter) in many ways, but differs in the more slender form, fewer and more reflected varices and in the lack of the color band.

PLATE 20

- Fig. 1. *Epitonium (Nitidiscala) indianorum* (Carpenter). Type, No. 15,521 in the U. S. National Museum, from Neah Bay, Washington. Carpenter describes the species as having 10 whorls and measuring, length 26, diameter 9 mm.
- Figs. 2a, 2b. *Epitonium (Nitidiscala) indianorum* (Carpenter). Plesiotype, No. 343, S.D.S.N.H., from Forrester Island, Alaska. Length 35, diameter 11 mm.
- Fig. 3. *Epitonium (Nitidiscala) tinctum* (Carpenter). Specimen No. 19,510 in the U. S. National Museum, labelled "*Scalaria indianorum* variety." It was collected by Cooper at San Pedro, California, and probably is the specimen cited by Carpenter in his original description of variety *tincta*. The figure is from a U. S. National Museum photograph stated to be twice natural size.
- Fig. 4. *Epitonium (Nitidiscala) tinctum* (Carpenter). Specimen No. 13,830b in the U. S. National Museum, from the lot marked "Type of *E. subcoronatum* Cpr." The specimen came from Monterey, California, and the measurements are given in the original description as length 11, diameter 5.5 mm.
- Figs. 5a, 5b. *Epitonium (Nitidiscala) tinctum* (Carpenter). Plesiotype, No. 344, S.D.S.N.H., from Point Vincent, near San Pedro, California. Length 12, diameter 5.5 mm.
- Figs. 6a, 6b. *Epitonium (Nitidiscala) cooperi* Strong, n. s. Type, No. 345, S.D.S.N.H., from San Pedro, California. Length 20, diameter 8 mm.
- Fig. 7. *Epitonium (Nitidiscala) cooperi* Strong, n. s. Specimen No. 46,222, a paratype, in the U. S. National Museum, labelled "*E. hindsi* = *fallaciosum* Dall from San Pedro."
- Figs. 8a, 8b. *Epitonium (Nitidiscala) cooperi* Strong, n. s. Specimen No. 56,052, a paratype, in the U. S. National Museum, labelled "*E. indianorum tinctum* Cpr., Monterey, identified by Dall." Length 14, diameter 6 mm.
- Fig. 9. *Epitonium (Nitidiscala) sawinae* Dall. Type, No. 109,309 in the U. S. National Museum. It was dredged near Avalon, Catalina Island, California, and the measurements are given as length 10.5, diameter 4 mm.
- Fig. 10. *Epitonium (Nitidiscala) sawinae catalinense* Dall. Type, No. 109,502 in the U. S. National Museum. It was dredged off Catalina Island, California, and the measurements are given as length 13.5, diameter 6 mm.
- Fig. 11. *Epitonium (Nitidiscala) californicum* Dall. Type, No. 201,202 in the U. S. National Museum. The type locality is given as San Miguel Island, California, and the measurements as length 10.5, diameter 4 mm.
- Figs. 12a, 12b. *Epitonium (Nitidiscala) californicum* Dall. Plesiotype, No. 346, S.D.S.N.H., from Alamitos Bay, Los Angeles County, California. Length 10, diameter 4 mm.